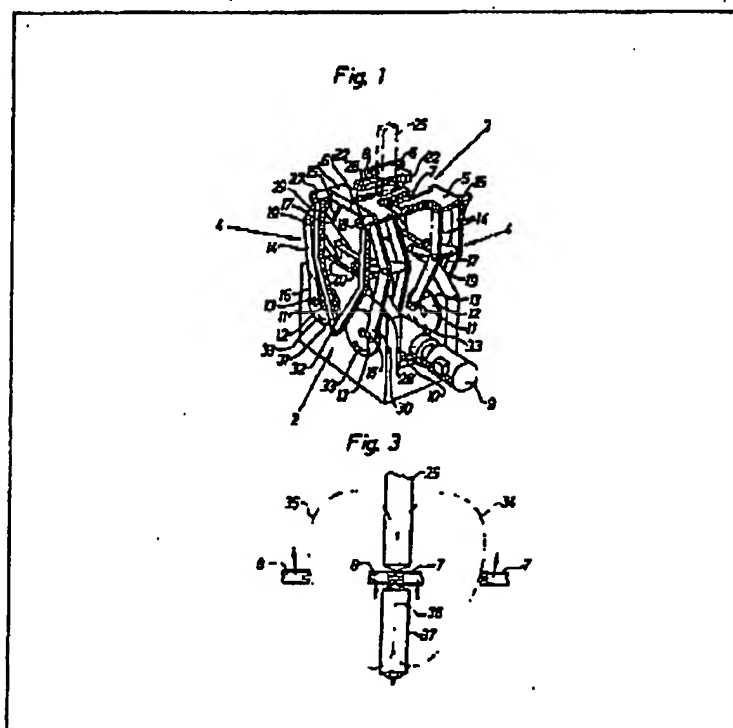


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## (54) Sealing packages

(57) A machine for producing packages (37) has two separate sets of tools (7, 8) working "hand-over-hand" which act upon a tube (23) formed beneath a tube-forming device so as to provide the tube with pairs of transverse closure seams at predetermined intervals and divided between the transverse closure seams into individual packages (37). In order to move the tools (7, 8) in oval orbits (34, 35) with a common rectilinear work path (36) aligned parallel to the tube axis (25), connecting-rod transmissions (4) are provided, the cranks (11, 12, 13) of which are driven through asymmetrical gears (10, 41, 44, 45) so that the two sets of tools (7, 8) alternately engage the tube at half-cycle intervals.



The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

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Fig. 1

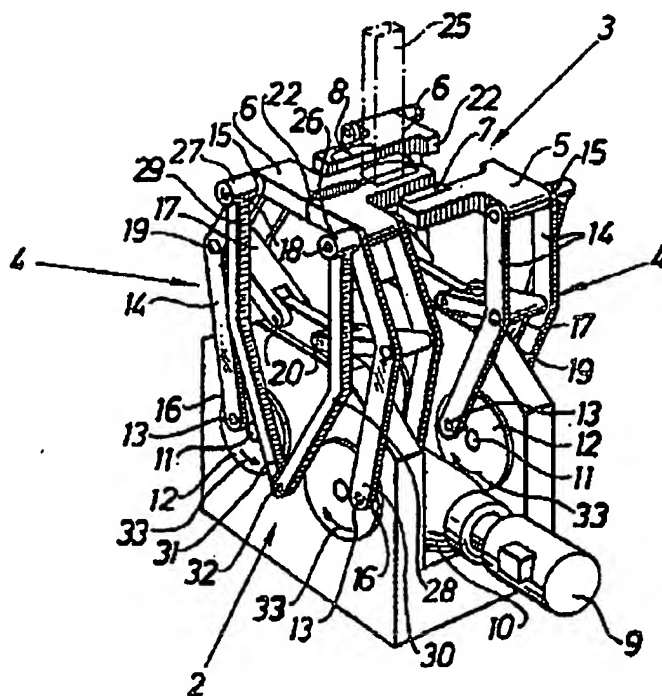
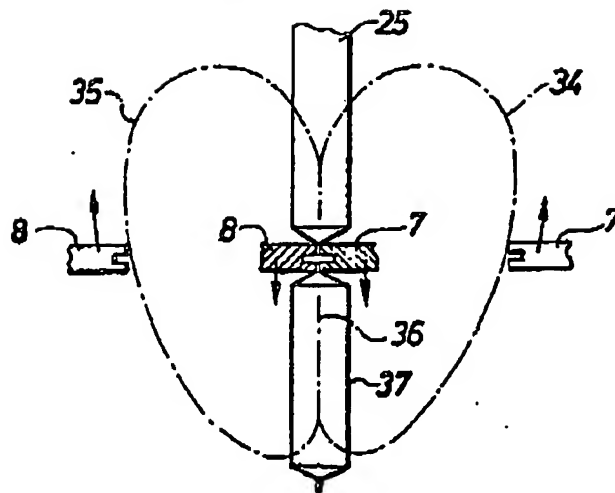


Fig. 3



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Fig. 2

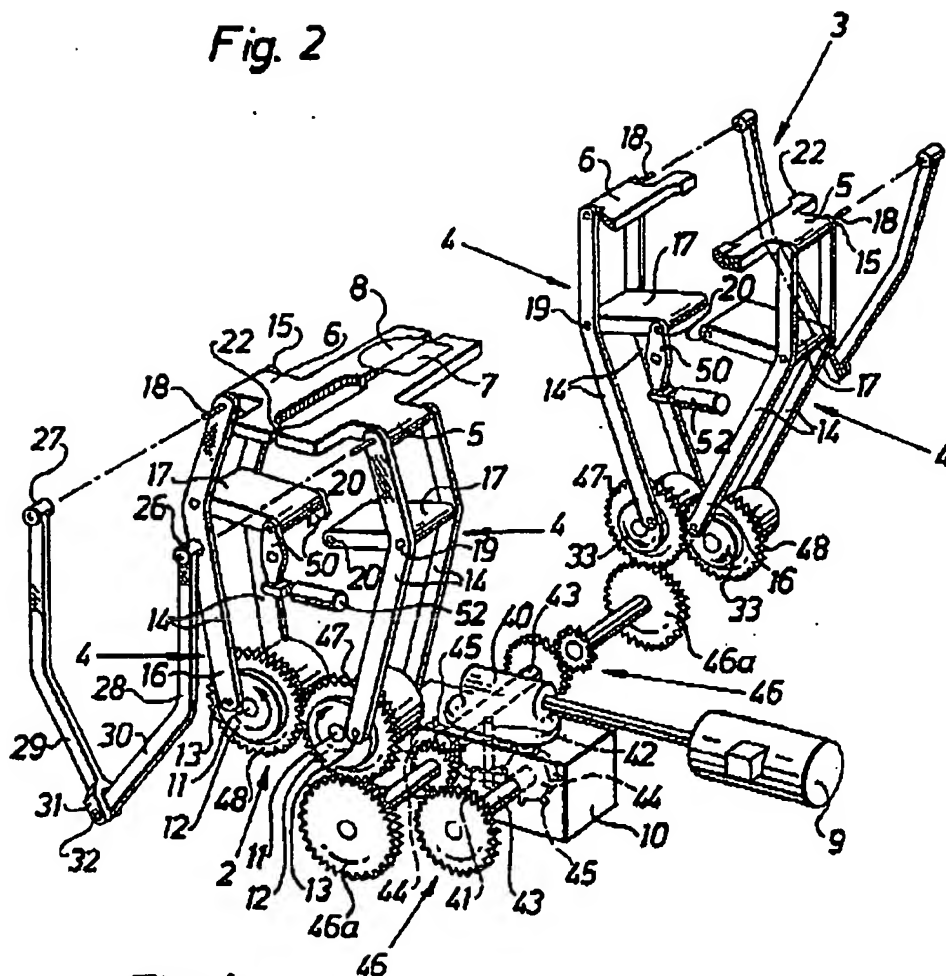
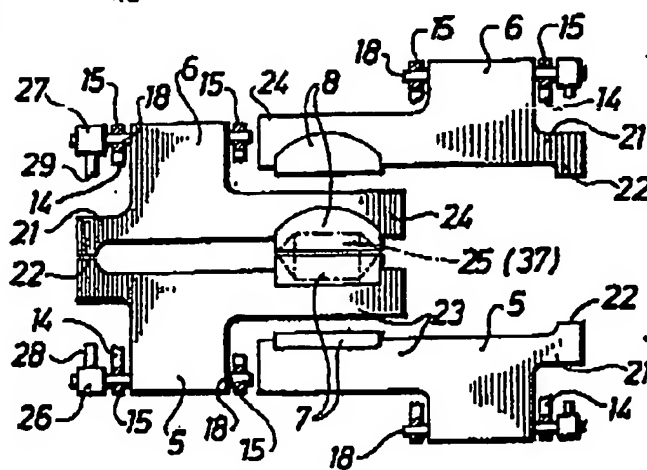


Fig. 4

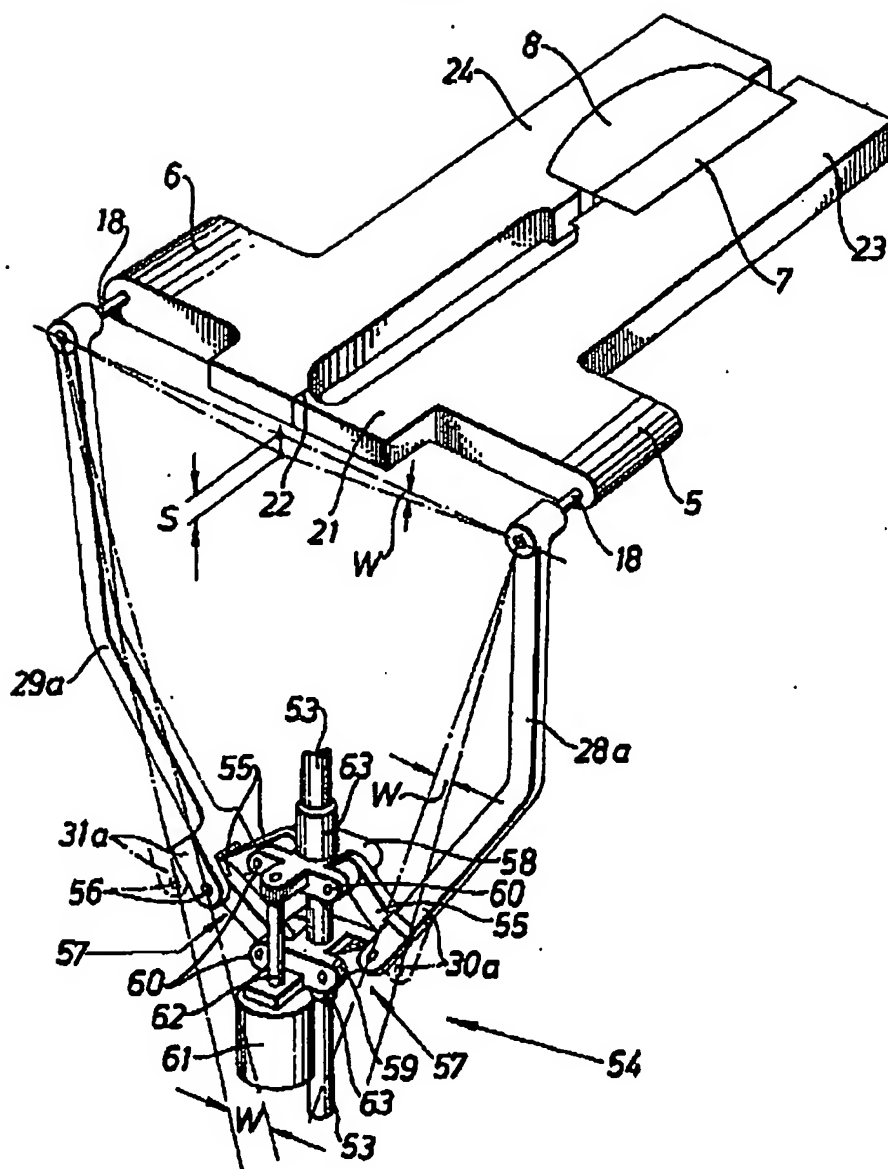


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Fig. 5



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## SPECIFICATION

Improvements in and relating to the production of packages

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*Advantages of the invention*

In the machine according to the invention having characterizing features according to the principal claim, the tools of both sets act upon the tube simultaneously during the descent within a pre-selected period and approach each other during said period up to a pre-selected distance. The tube is thereby brought downwards at high speed without interruption and a tube section enclosed between the tool sets can, particularly if mould plates etc. are provided between the tool sets, be moulded into a desired, e.g. parallelepipedic configuration. The machine is silent in running and has little proneness to wear.

Advantageous further developments of the machine stated in the principal claim are possible by virtue of the measures enumerated in the subordinate claims.

*Drawings*

Three exemplary embodiments of the invention are illustrated in the drawings and described more fully in the description herein below.

Figure 1 shows a first exemplary embodiment in a perspective view;

Figure 2 shows a second exemplary embodiment in a perspective view;

Figure 3 shows the orbits of tools of the exemplary embodiments illustrated in Figures 1 and 2;

Figure 4 shows the tool sets of the exemplary embodiment illustrated in Figures 1 and 2, in plan; and

Figure 5 shows a further exemplary embodiment in perspective view.

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*Description of the exemplary embodiments*

The exemplary embodiment shown in Figure 1 has two pairs 2, 3 of connecting-rod transmissions 4; tool brackets 5, 6 mounted on the connecting-rod transmissions 4 and facing mutually in pairs; tools 7, 8, and an asymmetrical gear 10 driven by a motor 9. The connecting-rod transmissions 4 of each pair, 2 or 3, are of symmetrically similar construction. Each connecting-rod transmission 4 exhibits a crankshaft 11 with two crank discs 12 and two co-axially aligned crank pins 13, two co-incidentally constructed connecting rods 14 provided at an interval with upper and lower ends 15, 16 and a pivotably mounted guide rod 17. The lower ends 16 of the connecting rods 14 are mounted on the crank pins 13. In the upper ends 15 of each two coincidentally, mutually associated connecting rods 14 there is mounted a pivot 18 which is attached integrally in rotation to the tool bracket 5 or 6 projecting between the upper ends 15 of the connecting rods 14. Between the lower and the upper ends 15, 16 the guide rod 17 is connected pivotably to the connecting rods 14 by means of a pin 19. Starting from the connecting rods 14, the guide rods 17 of a pair, 2 or 3, are aligned projecting towards each other, and are mounted

pivotably by their other ends each at a stationary pivot point 20. Starting from the connecting rods 14, as may be seen best from Figure 4, each tool bracket 5, 6 comprises a short arm 21 with stop 22 extending substantially in the horizontal direction and a longer arm, 23 or 24. The tools 7, 8 for the zonal flattening transverse closure and cutting off of a tube 25 of sealable packaging material are attached to the longer arms 23, 24. The stops 22 and the tools 7, 8 of each set are directed towards each other. The upper end 26, 27 of each of guide rod levers 28, 29 is connected integrally in rotation to the pivot members 18. At their lower end 30, 31 the guide rod levers 28, 29 are mutually articulated by means of a bolt 32. The guide rod levers 28, 29, through the pivots 18, maintain the tools 7, 8 of each set mutually aligned in every vertical position.

When the crankshafts 11 of one pair 2 are rotated in contrary directions (arrow 33), the connecting rods 14 connected to the guide rods 17 move so that the pivot members 18 travel over pre-determined oval orbits with vertical downward paths. Consequently the operative surfaces of the tools 7, 8 travel along the orbital paths 34, 35 illustrated in Figure 3 with a common, straight, vertical work-path 36, within which the tube of packaging material 25 is flattened over selected zones, provided at each operation with a pair of closely-adjacent transverse seams and simultaneously cut between the transverse seams of the pair, so that a package is separated beneath the cutting line.

For the alternate gripping of the tube 25 by the two sets of tools 7, 8 the crank pins 13 of the crank discs 12 of the one pair 2 of connecting-rod transmissions 4 rotate in staggered relation substantially by one half revolution out of phase with reference to the like crank pins 13 of the crank discs 12 of the other pair 3, so that a hand-over-hand working of the two tool sets occurs.

After the tools 7, 8 have travelled over the common work path 36 the pivots 18 separate and guide said tools 7, 8 along the oval orbital paths 34, 35 back to the rectilinear work path 36. During this step the space between the pivots 18 is temporarily increased sufficiently for the tools 7, 8 of the second pair 3 to travel, unobstructed, over the same downward oriented work path 36, while the tools 7, 8 of the first pair 2 return into the upper region.

By means of the asymmetrical gear 10 the crankshafts 11 of the pairs 2, 3 are driven so that the tools 7, 8 of the pairs 2, 3 engage the tube of packaging material 25 simultaneously, at least for a short time, and in doing so approach to a distance which is pre-determined by the dimensions of the packages 27 being produced from the tube 26. The gear 10 driving the crankshafts 11 in the requisite manner is shown in Figure 2.

The gear 10 has a globoidal cam 41 with vertical axis of rotation 42 driven uniformly by the motor 9 through a bevel wheel gear 40, two wheels 44 opposite the vertical axis of rotation 42 rotatable above horizontal axes 43 with cam followers 45 rolling consecutively on the globoidal cam 41 and reduction gears 46 following the wheels 44. Each of the two reduction gears 46 drives, each through a

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gear wheel 46a, two machine gear wheels 47, 48 which rotate the cranks 11.

Instead of the asymmetrical gear 10 comprising a globoidal cam 41, there may be use of two different gears driven conjointly by the motor 9 each having a differential input and with control cam transmissions acting upon the differential inputs.

The second exemplary embodiment shown in Figure 2 differs from the first embodiment (Figure 1) in that, for each one of the guide rods 17 of a connecting-rod transmission pair 2 or 3, the pivots 20 are each secured to a pivotably mounted lever 50. The levers 50 associated with a guide rod 17 are each connected to a work cylinder 52 in which can be set up a selected pressure and constitutes, through the levers 30 and the pivot 20, a resilient abutment for the guide rod 17 to limit the pressure to be exerted by the tools 7, 8. The pressure is adjustable during the running of the machine.

The stops 22 are formed so that they abut on each other as soon as the tools 7, 8 reach their operative position. The conjoint force of two adjacent connecting rods 14 is applied to the tool bracket 5 or 6 each time between the stop 22 and the tools 7 or 8. The stop 22 counteracts the torque which results from the tool pressure and the unavoidable lateral interval of the tool 7 or 8 from the centres between the mutually associated connecting rods 14. By this means the connecting rods 14 are not stressed in torsion and are therefore formed only for flexural rigidity in the manner easily dealt with technically.

To make it possible to effect, intermittently during the operation of the machine, a vertical adjustment of one set of tools with reference to the other set, in the third exemplary embodiment shown in Figure 5 the lower ends 30a, 31a of guide rod levers 28a, 28a connected to the pivot pins 18 are coupled indirectly through a spreading mechanism 54 mounted slidably on a guide rod 55 aligned parallel to the work path 36 of the tools 7, 8. The spreading mechanism 54 has two scissors mechanisms 57 each consisting of two guide rods 58 and a bolt 59, two intermediate pieces 58, 59 arranged between the scissors members 57 with pivot rods 60 carrying the guide rods 55 and an adjusting cylinder 61 with a piston rod 62 projecting out of it, which extends parallel to the vertical work-path 36 of the tools 7, 8. Said guide rod 63 projects through guide bushings 63 provided coaxially and coincidentally in the intermediate pieces 58, 59.

The adjusting cylinder 61 and its piston rod are connected to the intermediate pieces 58, 59. A loading of the adjusting cylinder 61 produces a variation in the interval of the intermediate pieces 58, 59. Said variation of interval results through the pivot rods 60 and the guide rods 55 in a variation in the distance of the bolts 59, which causes a pivoting of the guide rod levers 28a, 28a through an angle W. The pivoting of the guide rod levers 28a, 28a out of the alignment shown by solid lines into the position indicated by chain dotted lines causes a vertical movement of the mutually facing operative surfaces of the tools 7, 8 by a distance S. The vertical adjustment of the tools 7, 8 relatively to the pivot pins 18 which can be effected in the described

manner, is carried out in case of need for a register correction in drawing down and the subdivision of the tube of packaging material 25 into individual packages 37. Instead of the spreading mechanism 54 pivoting the guide rod levers 28a, 28a, a selectively operable vertical adjustment means for the tools 7, 8, formed in any desired manner may be provided.

## CLAIMS

1. Machine for producing packages incorporating a device for forming a tube from a web of packaging material, two sets of tools arranged on tool brackets working substantially vertically hand-over-hand following the tube shaping device, which tools engage the tube, apply a pair of transverse closure seams at a time, at equispaced intervals and cut the tube between the transverse closure seams into individual packages, and transmission means for effecting the consecutive movement of the tools of the sets in oval orbits with a common work path oriented in the longitudinal axis of the tube of packaging material, characterized in that the transmission is constructed as a connecting-rod transmission (4), with connecting rods (14) moving in substantially vertical and mutually parallel planes, guide rods (17) guiding the connecting rods (14) and cranks (11, 13) driving the connecting rods (14), which are drivingly associated with a common asymmetrical gear (10).

2. Machine as claimed in Claim 1, characterized in that an asymmetrical gear (10) comprises a uniformly driven globoidal cam (41) with a vertical axis of rotation (42) and two wheels (44) rotatable about horizontal axes (43) and in mesh with the globoidal cam (41), the axes (43) of which are arranged parallel and mutually opposite with reference to the axis of rotation (42) of the globoidal cam (41), and that each wheel (44) acts through a reduction gear (45) upon cranks (11, 12, 13) in order to move one of the two sets of tools.

3. Machine as claimed in Claim 1 or 2, characterized in that tool brackets (5, 6), starting from the connecting rods (14), comprise first arms (23 and 24) extending transversely to their plane of movement carrying the tools (7 and 8) and second oppositely oriented arms (21) with stops (22) terminating in the planes of the work surfaces of the tools (7, 8).

4. Machine as claimed in Claim 1, characterized in that at least half the number of guide rods (17) guiding the connecting rods (14) are mounted resiliently to yield substantially in their longitudinal directions.

5. Machine as claimed in Claim 4, characterized in that the guide rods (17) are articulated to pivotally mounted levers (50), and that work cylinders (52) providing a preselected pressure biased against the said levers (50) are installed.

6. Machine as claimed in Claim 1, characterized in that at least half the number of the guide rods (17) are of longitudinally resilient construction.

7. Machine according to any of Claims 1 to 6, characterized in that the tool brackets (5, 6) are mounted on the connection rods (14) by means of pivot members (18) and are aligned mutually facing,

that the tools (7, 8) are respectively spaced from said pivot member (18), that the tool brackets (7, 8) are associated mutually in pairs and are connected to a guide rod lever (28, 29) in each case, and that the  
5 pivotable ends (30, 31) of the respectively mutually associated guide rod levers (28, 29) are articulated to one another.

8. Machine as claimed in Claim 7, characterized in that between each two ends (30a, 31a) associated mutually in pairs of the guide rod levers (28a, 29a) there is provided a spreading mechanism (54) which modifies the angular misalignment of the guide rod levers (28a, 29a).

9. A package-forming machine comprising the  
15 two sets of sealing means each adapted to grip, and transversely seal and sever, a tube of packaging material, each set being mechanically mounted and driven to follow an endless path beside said tube in order to grip the tube at an upper point of its path,  
20 draw down the tube, and release the tube at a lower point of its path, and the two sets of tools adapted alternately to engage the tube at half-cycle intervals.

10. A package-forming machine substantially as described herein with reference to the accompanying  
25 drawings.

11. A package whenever produced by a machine as claimed in any preceding claim.

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